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ABSTRACT

Without teacher change, a successful educational reform is either incidental or superficial. Therefore, it is very important to understand the nature of teacher change for science educators. Mezirow's transformation theory, a constructivist theory, provides a theoretical basis for both teacher learning and teacher change. This paper presents an overview of Mezirow's theory of transformative learning. (YDS)

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MEZIROW'S THEORY OF TRANSFORMATIVE LEARNING WITH IMPLICATIONS FOR SCIENCE TEACHER EDUCATORS

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Teacher change is the precursor of reform in education. Without it, efforts intended to facilitate reform are thwarted and nullified leaving any apparent progress either incidental or superficial. Science educators therefore, must be adept at facilitating teacher change when answering the clarion call for reform in science education. For reform to come about, science educators must have an understanding of both the nature of teacher change and the manner by which such change is facilitated. The purpose of this article is to provide an overview of Mezirow's theory of transformative learning (1991) and its implications for science educators in fostering teacher change and learning.

Transformative Theory of Adult Learning

Mezirow's transformation theory (1991), a constructivist theory of adult learning, is a comprehensive, idealized, and universal model consisting of the generic structures, elements, and processes of adult learning and development. Transformation theory provides a theoretical basis for both teacher learning and teacher change. Teacher change is the process of altering, modifying or transforming the practices, attitudes, beliefs, and perceptions of teachers. Change is an individual learning process. For each teacher, change is a highly personal experience which entails learning and developmental growth.

Overview of Transformation Theory

Teachers, as adult learners, are caught in their own histories. No matter how good an adult is at making sense of their experiences, they all start with what they have been given and operate within horizons set by the ways of seeing and understanding they acquired through prior learning.

> This formative learning occurs in childhood both through socialization (informal or tacit learning of norms from parents, friends, and mentors that

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> allows us to fit into society) and through our schooling. Approved ways of seeing and understanding, shaped by our language, culture, and personal experience, collaborate to set limits to our future learning. (Mezirow, 1991, p.1)

Adults function in a changing world. "Contradictions generated by rapid dramatic change and a diversity of beliefs, values, and social practices are a hallmark of modern society" (Mezirow, 1991, p.2). Adults living in such a society must learn how to keep from being overwhelmed by these changes. The knowledge acquired from one's formative learning is no longer sufficient. Mezirow (1991) continued:

> Rather then merely adapting to changing circumstances by more diligently applying old ways of knowing, [adults] discover a need to acquire new perspectives [emphasis mine] in order to gain a more complete understanding of changing events and a higher degree of control in their lives. The formative learning of childhood becomes transformative learning in adulthood. (p.2)

Thus, adult learning can be defined as the process of using a prior interpretation to construe a new or revised interpretation of the meaning of one's experiences in order to guide future action. An individuals acquired frame of reference is central to this learning theory. It is through this frame of reference or personal paradigm that all meaning is construed and all learning takes place. Action in this context includes making decisions and associations, revising points of view, reframing or solving problems, modifying attitudes, or producing changes in behavior. For Mezirow (1991), "action in transformative theory is not only behavior, the effect of cause and effect, but rather 'praxis', the creative implementation of a purpose." (p. 12)

Adults construe meaning from both symbolic models or exemplars and habits of expectations. These habits of expectations are the meaning perspectives and meaning schemes which frame and organize these symbols into systems. The symbols that adults project onto their sense perceptions are filtered through these meaning perspectives and meaning schemes. As a result, symbols (and metaphors) take on new and enhanced meanings. Mezirow termed them loaded perceptions. Adult learning, development, and change come about when meaning

perspectives and meaning schemes are transformed through reflection and critical discourse.

Meaning Perspectives and Meaning Schemes

Meaning perspectives are both a system for interpreting and evaluating the meaning of an experience and sets of habits of expectation which filter perception and cognition. Meaning perspectives and meaning schemes are structures of psycho-cultural assumptions within which new experiences are assimilated and transformed by past experiences (Mezirow, 1978, 1981, 1991). Mezirow, (1991) added that "meaning perspectives, or generalized sets of habitual expectation, act as perceptual and conceptual codes to form, limit, and distort how we think, believe, and feel and hope, what, when, and why we learn. They have cognitive, affective, and conative dimensions." (p. 34.) Meaning perspectives are more than a way of seeing. Meaning perspectives constitute an orientating frame of reference that serves as a tacit belief system. In this respect, they are similar to Polyani's (1966) perspectives, which were defined as systems of constructs involved in tacit knowing. Dewey (1933) wrote both on the importance of meaning perspectives and on one's normal unconsciousness of them.

Meaning perspectives serve as one of three sets of codes significantly shaping sensation and delimiting perception, feelings, and cognition. The sets of codes include the sociolinguistic, psychological, and epistemic (Mezirow, 1991, 1994). Sociolinguistic codes are those involved in dialogue or communicative action and allow individuals to relate to the world around them, to other people, and to their own feelings, intentions, and desires. Psychological codes are those which shape self-concept and epistemic codes pertain to the ways that individuals know and how they make use of that knowledge. Meaning perspectives are similar to what others have called personal frames or paradigms. Kuhn (1962) referred to a paradigm as a collection of ways of seeing, methods of inquiry, beliefs, ideas, values, and attitudes that influence the conduct of scientific inquiry.

Meaning schemes are the more specific dimensions of one's personal frame of reference or meaning perspective. Meaning schemes are "constellations of concepts, beliefs, judgments, and feelings which shape a particular interpretation" (Mezirow, 1994, p. 223). As such, they

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contain the specific beliefs, knowledge, feelings, and value judgments that become articulated in an interpretation (Mezirow, 1991, 1994).

Perspective Transformations

Perspective transformations are the most distinctive domain of adult learning. A perspective transformation involves what Habermas (1984, 1987) described as emancipatory action. Mezirow (1981) defines a perspective transformation as the "emancipatory process of becoming critically aware of how and why the structure of psycho-structural assumptions has come to constrain the way we see our relationships, reconstituting this structure to permit a more inclusive and discriminating integration of experience and acting upon these new understandings." (p. 6)

A transformation in meaning perspective can happen only through perspective taking, assimilating the perspectives of others (Mezirow, 1978). However, perspective taking is not role taking. Perspective taking implies a conscious recognition of the difference between one's old perception and the new one and a desire to appropriate the newer perspective because it is of more value. Conceptualizing one's self-concept in the process of perspective taking is developmentally a function of maturity (Mezirow, 1978).

A perception is the effect or product of becoming aware in one's mind. Individuals must draw upon their past knowledge to make interpretations that help them choose the dimensions of any new experience to which they will attend. Individuals also draw upon prior learning so that they may associate the new experience with existing ideas. "This tacit process of reviewing and making interpretations based on prior experience to delimit the slice of new experience to which we will attend is what we refer to as perception" (Mezirow, 1991, p. 16).

Adults rely on their frames of reference in order to interpret and give meaning to what they are experiencing. As people mature, they improve in their ability to anticipate reality by developing and refining their meaning perspectives and meaning schemes so that they may use them more effectively to integrate and differentiate experiences. When a preexisting meaning perspective or meaning scheme can no longer comfortably deal with anomalies in a new

situation, a transformation can occur. "Adding of knowledge, skills, or increasing competencies within the present perspective is no longer functional: creative integration of a new experience into one's frame of reference no longer can resolve the conflict. One not only is made to react to one's own reactions, but to do so critically" (Mezirow, 1978, p. 104).

Perspective transformations are commonplace in an adult's life (Mezirow, 1978). As people mature, they make an intentional movement to resolve contradictions and to proceed to developmentally advanced conceptual structures. As such, adults are continually restructuring the reality of the past by reinterpreting it from successive vantagepoints. Perspective transformations, therefore, are critical to the process of adult learning and adult change.

Perspective transformations are precipitated by experiences that cannot be resolved by simply acquiring more information, enhancing problem solving skills, or adding to one's competencies. A perspective transformation can occur either through an accretion of transformation of meaning schemes resulting from a series of dilemmas, an epiphany, or in response to an externally imposed epochal dilemma (Mezirow, 1978, 1981, 1991). "However, any major challenge to an established perspective can result in a transformation" (Mezirow, 1991, p. 168). Once an individual has moved forward to a new meaning perspective they can never return to those in the past. However, after making a new meaning perspective the individual may require special support or assistance to maintain the will and determination to persevere.

"The process of perspective transformation has far reaching implications for the education of adults" (Mezirow, 1978, p. 107). The most significant behavior changes are functions of perspective transformations. A perspective transformation is often a precondition for meaningful changes in perception and behavior.

Adult Learning in Transformation Theory

Transformation theory includes four types of adult learning (Mezirow, 1991). They are described as follows:

1. Learning through meaning schemes. The adult further differentiates and elaborates previously acquired, taken for granted meaning schemes. Learning occurs within the structure of the adult's acquired frame of reference.
2. Learning new meaning schemes. New meaning schemes are created. The new meaning schemes are consistent and compatible with existing meaning perspectives.

3. Learning through transformation of meaning schemes. Learning here involves reflection on assumptions. In this type of learning the adult finds that his/her specific points of view have become dysfunctional. This realization leaves the adult with a sense of how inadequate his/her old ways of seeing and understanding meaning are.
4. Learning through perspective transformation. The most significant kind of learning. This type of learning begins when the adult encounters experiences, often in an emotionally charged situation, that fail to fit his/her expectations and consequently lack meaning, or if he/she encounters an anomaly that cannot be given coherence either by learning within existing meaning schemes or by learning new meaning schemes. These are analogous to paradigm shifts as described by Kuhn.

The Contexts of Learning

Mezirow (1991) believes that learning involves five primary interacting contexts. These contexts are:

1. The meaning perspective or frame of reference in which the learning is embedded.

2. The conditions of communication: language mastery; the codes that delimit categories, constructs, and labels; and the ways in which problematic assertions are validated.

3. The line of action in which the learning occurs. This has to do with implementing the purpose and intentionality of the learner and involves the exercise of their conative powers.

4. The self-image of the learner. This context is concerned with how the learner feels, how things are going, and how he/she sees their situation. The meaning of this "felt sense is implicit; that is, it is never equal to specific cognitive units. We explain our felt sense by interpreting it and reflecting upon our interpretation, using it as a criterion for assessing the correctness of our interpretation of our situation"(p. 14).

5.The situation encountered. In other words, the external circumstances within which and interpretation is made and remembered.

Fostering Transformational Learning

Mezirow (1991) identified a list of goals that anyone involved in the education of adults

must fulfill in order to facilitate learning and foster transformational learning. They are as follows:

Progressively decrease the learner's dependency upon the educator.

Help the learner understand how to use learning resources, especially the experience of others, including the educator, and how to engage in reciprocal learning relationships.

1.Assist the learner to define his/her learning needs, both in terms of immediate awareness and in terms of understanding the cultural and psychological, assumptions influencing his/her perceptions of needs.

2.Assist the learner to assume increasing responsibility for the defining of learning objectives, planning his/her own learning program, and evaluating progress.

3.Help the learner organize what is to be learned in relationship to his/her current personal problems, concerns, and levels of understanding.

4.Foster learner decision making. Select learning experiences that require choosing, expanding the learner's range of options, and facilitating the learner's taking the perspective of others who have alternate ways of understanding.

5.Encourage the use of criteria for judging that are increasingly inclusive and differentiating in awareness, self-reflective, and integrative of experience.

6.Foster a self-corrective, reflexive approach to learning- to typifying and labeling, to perspective taking and choosing, and to habits of learning and learning relationships.

7.Facilitate posing and solving of problems, including problems associated with the implementation of individual and collective action, and the relationship between personal problems and public issues.

8.Reinforce the self-concept of the learner as a learner and doer by providing

for progressive mastery and for a supportive climate with feedback to encourage provisional efforts to change and to take risks; by avoiding competitive judgment of performance; and by appropriate use of mutual support groups.

9.Emphasize experiential, participate, and projective instructional methods and use modeling and learning contracts where appropriate.

10.Make the moral distinction between helping the learner understand his/her full range of choices and ways to improve the quality of choosing and encouraging the learner to make a specific choice.

Fostering Transformative Learning in Teachers

Mezirow's transformation theory provides a theoretical framework for the processes of adult learning and development. As such, transformation theory also provides a theoretical basis for teacher learning and teacher change. Teacher learning is a precursor to teacher change. As such, the process of transformative learning has far reaching implications for facilitating teacher change. The most significant changes in a teacher's practices, attitudes, beliefs, and perceptions are functions of transformations of meaning perspectives and meaning schemes. Therefore, when planning learning experiences designed to facilitate science teacher change, science educators need to include those factors which foster transformational learning. These include the following (adapted from Mezirow, 1981, 1991):

Progressively decrease the science teacher's dependency upon the educator. To facilitate this, the learning experience must take place in a non threatening and supportive climate. Help the science teacher understand how to use learning resources and how to engage in reciprocal learning relationships. This can be accomplished if the learning experience provides for interaction, collaboration, and camaraderie.

1.Help the science teacher to define his/her learning needs. In order for this to happen, the learning experience must provide the teacher with the opportunity to become an active learner and to look through learner's eyes.

2.Help the science teacher to organize what is to be learned to his/her current views.

3.Foster science teacher decision making. Select learning experiences that require expanding the teacher's range of options and facilitate perspective taking.

4.Encourage the use of criteria for judging that are increasingly inclusive and differentiating in awareness, self-reflective, and integrative in experience.

5.Facilitate posing and solving problems.

6.Reinforce the self-concept and self-confidence of the science teacher. The teacher must leave the learning experience with increased self-confidence, self-esteem, and self-reliance.

7.Emphasize experiential and participative instructional methods and use modeling where appropriate.

8.Create opportunities for critical discourse. Again, this can be accomplished if the learning experience provides for interaction, collaboration, and camaraderie.

9.Provide opportunities for reflection.

10.Provide for an assessment of gains made as a result of transformative learning. The learning experience must provide the science teacher with the opportunity to assess the impact the implemented change is having on teaching and learning in the classroom.

11.Provide support for the science teacher who has made a transformation. This can be provided by others such as fellow members of a learning group, co-workers, students, administrators, or an educational mentor.

Conclusion

A great potential for improving science education lies with the classroom teacher. Therefore, programs directed at changing science teachers' behaviors are essential components in the process of improving science instruction (Abell & Pizzini, 1992). As such, efforts intended to bring about reform in science education are futile unless they facilitate science teacher change. However, science teacher change will only take place if accompanied by learning. Therefore, programs designed to alter, modify or transform the practices, attitudes, beliefs, and perceptions of science teachers must do so by facilitating learning. Mezirow's transformative theory, a

constructivist theory of adult learning, is a comprehensive, idealized, and universal model consisting of the generic structures, elements, and processes of adult learning and development. As such, transformation theory provides the theoretical basis for both science teacher learning and science teacher change. Science educators need to be knowledgeable of the factors that facilitate adult learning, especially those which foster perspective transformations, and incorporate them when planning experiences designed to facilitate science teacher change.

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